



HEATS

THERMAL ENERGY STORAGE

PROJECTS:	15	FUNDING YEAR:	2011
TOTAL INVESTMENT:	\$37.3 million	PROGRAM DIRECTOR:	Dr. Ravi Prasher
PROJECT DETAILS:	www.arpa-e.energy.gov/ProgramsProjects/HEATS.aspx		

PROGRAM

The 15 projects that make up ARPA-E's HEATS program, short for "High Energy Advanced Thermal Storage," seek to develop revolutionary, cost-effective ways to store thermal energy. HEATS focuses on 3 specific areas: 1) developing high-temperature solar thermal energy storage capable of cost-effectively delivering electricity around the clock and thermal energy storage for nuclear power plants capable of cost-effectively meeting peak demand, 2) creating synthetic fuel efficiently from sunlight by converting sunlight into heat, and 3) using thermal energy storage to improve the driving range of electric vehicles (EVs) and also enable thermal management of internal combustion engine vehicles.

INNOVATION NEED

Thermal energy—or heat energy—is involved in over 90% of all energy technologies. There is a critical need to find efficient, cost-effective ways to store it. Many HEATS projects are focused on finding ways to efficiently and cost-effectively store solar thermal energy so that solar power plants can generate electricity 24 hours a day instead of just when the sun's out—significantly improving the plant's capacity and dramatically increasing its ability to power more homes and businesses. HEATS projects are also focused on finding cost-effective and efficient ways to store nuclear energy so that emissions-free nuclear power plants can deliver on-demand peak power. This is important because today nuclear energy is only used for baseload power generation and can't ramp up to meet peak-power demand. Other HEATS projects are finding ways to use thermal energy to produce synthetic fuel from sunlight, and several HEATS projects are focused on modular thermal energy storage advancements that could provide heating and cooling to the passenger cabin in an electric vehicle (EV) without draining the electric batteries—helping the vehicle travel farther.

HEATS PROGRAM GOALS

- Enable non-intermittent solar power plants and peak-power nuclear power plants
- Create transportable fuels from sunlight
- Modular thermal energy storage for EVs

POTENTIAL IMPACT

If successful, HEATS projects would advance thermal energy storage technologies and find ways for solar power plants to generate electricity 24 hours a day, for nuclear power plants to contribute to meet peak demand, for vehicles to operate on synthetic fuel derived from the sun's heat, and for EVs with improved HVAC systems to travel farther.

- **SECURITY:** Cost-effective thermal energy storage would enable increased use of domestic solar and nuclear energy resource, and increased use of thermal fuels and EVs would reduce U.S. reliance on fossil fuels—strengthening the nation's energy security.
- **ENVIRONMENT:** Thermal energy power generation could help decrease fossil-fuel-based electricity use and harmful emissions from coal-burning power plants. Widespread use of EVs would also help reduce harmful emissions from the transportation sector.
- **ECONOMY:** Thermal energy storage systems could make it less expensive to generate power from nuclear and renewable solar energy, which in turn could help stabilize electricity rates for consumers. Advancements in thermal fuels and EVs could spur economic growth in those industries.
- **JOB:** Widespread use of advanced energy storage technologies, thermal fuels, and EVs could create jobs in engineering, manufacturing, and construction for American workers.